

(19)



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(11) Publication number:

0 630 601 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **94201551.2**(51) Int. Cl.⁵: **A47F 3/04**(22) Date of filing: **01.06.94**(30) Priority: **28.06.93 IT PD930145**(43) Date of publication of application:
28.12.94 Bulletin 94/52(84) Designated Contracting States:
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I-35131 Padova (IT)(54) **Refrigerated display case.**

(57) A vertical display counter (3) is disclosed which has a refrigerated compartment provided with an access opening protected by a cold air barrier and removable closure means (15); the counter is also equipped with ventilating means (20,32,41) to promote a non-turbulent circulation of ambient air between the barrier and the closure means (15), while the latter are in use, thereby preventing turbulence phenomena from disturbing the cold air barrier.

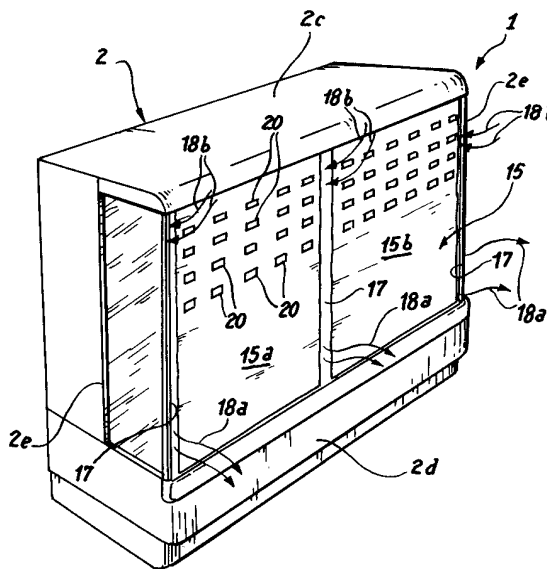


Fig. 1

EP 0 630 601 A1

This invention relates to a refrigerated display counter of the type which comprises a counter body to enclose a refrigerated compartment having at least one vertically extending access opening protected by a barrier of cold air, said opening being provided with removable closure means for temporarily isolating said compartment from the ambience outside the counter body.

Display counters with the above features have been known and widely used at stores and supermarkets. They are generally fitted with shelves or racks on which perishable food products, adapted for preservation in a refrigerated environment, are displayed for sale.

The removable closure means of the opening that gives access to the refrigerated compartment generally are used overnight, or while the store is closed, in order to reduce the thermal exchange between the refrigerated compartment and the ambience. Such means consist as a rule of single- or multiple-sheet curtains, each sheet being provided with a respective take-up device located at the counter body top.

Due to constraints on the design and construction of the counter, the sheets of such curtains are not guided or otherwise held tight against the counter body along the two opposed vertical sides thereof. Thus, a gap has been accepted, in the stretched condition of the curtain, either between two adjacent sheets or between the edge of one sheet and the adjoining counter body shoulder, through which ambient air can enter the refrigerated compartment.

On contacting the refrigerated produce, and especially the shelves, which are held at a low temperature by the refrigerated air, the warmer and moisture-laden outside air releases its moisture content in the form of condensate. It is on this account that the produce on display and the shelves are found wet upon removal of the covering curtain.

The underlying problem of this invention is to provide technical arrangements in a refrigerated display counter whereby the drawbacks with which the aforesaid prior art is beset can be obviated.

This problem is solved, according to the invention, by a display counter of the kind indicated in the introduction and characterized in that it comprises ventilating means associated with either or both of said counter body and said closure means to promote a non-turbulent circulation of ambient air between said cold air barrier and said closure means.

In practice, the approach of this invention is based on the observation that, since the gaps between curtain sheets are relatively small, the ambient air is admitted into the refrigerated compartment as a relatively high-velocity flow, often accompanied by turbulence phenomena. This dis-

turbs the cold air barrier protecting the refrigerated compartment, thereby the ambient air is allowed to penetrate deeply inside. In marked contrast with expectations, it has also been found that by allowing or promoting a stream of ambient air adjacent to the curtain or another closure arrangement which flows along a parallel direction to the stream of barrier air, the inflow of ambient air to the refrigerated compartment can be greatly attenuated, thereby significantly reducing the formation of condensate over the shelves and the goods on display.

The features and advantages of the invention will be apparent from the following detailed description of three embodiments thereof, given by way of illustration and not of limitation, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a refrigerated display counter embodying this invention;

Figure 2 is a perspective view of a display counter according to a second embodiment of the invention;

Figure 3 is a cross-sectional view showing schematically a third embodiment of the display counter according to this invention; and

Figure 4 is a cross-sectional view showing schematically a third embodiment of the display counter according to this invention.

In Figures 1 and 3, a refrigerated display counter is generally shown at 1 which includes an insulated counter body 2 having a bottom 2a, a back 2b, a top wall or ceiling 2c, a front wall 2d, and two shoulders or lateral sides 2e.

The front wall 2d stands upright on the bottom 2a through a short portion only of the vertical extent of the counter 1, the remaining portion having an access opening defined therein for accessing a refrigerated compartment 3 of the counter.

The compartment 3 is bounded, inside the body 2, by three walls denoted by 4a,b,c, respectively, which run a short distance away from the bottom 2a, the back 2b, and the ceiling 2c, respectively.

A duct 5 is bounded between said walls and the body 2 for the circulation of cold air, and is open at its opposite ends to the compartment 3, respectively through a return mouth 6 for the air to be cooled and a delivery outlet 7 for the cooled air. A plurality of additional cold air delivery outlets 10 are provided in the wall 4b.

In order to promote circulation and refrigeration of the air in the duct 5, the latter has one or more electric fans 8 and a heat exchanger 9 of a refrigerating system arranged therein.

The produce to be preserved is displayed on shelves, collectively denoted by 11, which are supported on the wall 4b in a conventional way.

The cold air delivery outlet 7 is located relative to the shelves 11 and the access opening of the

refrigerated compartment 3 such that a cold air barrier is formed which flows in the direction of arrows 12 to protect the interior of said refrigerated compartment.

The counter 1 further includes removable closure means for said access opening; in the example illustrated, such means comprise a curtain 15 having two sheets 15a, 15b, each provided with a respective take-up device 16, conventional in construction and operation. The curtain 15 is stretched into the working position shown in Figure 1 to temporarily isolate the refrigerated compartment 3 from the ambience, e.g. while the store accommodating the counter 1 is closed to the public.

In use, along the two vertical sides of each sheet of the curtain 15, between the edges of the adjacent sheets, and between the lateral sides 2e and the respective sheet edges 15a,b, respective gaps 17 are formed whose presence is made unavoidable by constructional constraints on the take-up device and its holders. The presence of such gaps, in combination with the difference in air temperature between the interior and the exterior of the refrigerated compartment 3, result in the air being circulated in the direction of arrows 18a and 18b. Actually, an outflow of denser cold air (arrows 18a) takes place from the lower portion of the counter and a corresponding inflow of warm air (arrows 18b) takes place into the upper portion of the counter.

In order to limit the velocity of the air inflow, the upper portion of each sheet of the curtain 15 is provided with ventilation means effective to promote a basically non-turbulent circulation of ambient air between the cold air barrier from the outlet 7 and the curtain 15. It has been found that by providing ventilation ports, such as those denoted by 20 in Figures 1 and 3; which can effectively slow down the air flowing therethrough and through the gaps 17 in the upper portion of the counter, the disturbance to the cold air barrier from the outlet 7 can be avoided or at least limited, thereby preventing warm ambient air from finding its way into the refrigerated compartment 3 in excessive amounts.

Preferably, the ports 20 are formed at the closest shelf 11 to the top wall 2c of the counter 1 such that, in use, they will locate directly above that shelf. Such ports are arranged in parallel rows; in the example illustrated, four rows of ports 20 are provided of which the lowermost two, i.e. the remotest two from the top wall 2c, locate at the upper shelf 11 of the counter 1 where the latter is formed with an elevation 21 on the front wall as indicated in broken lines in Figure 3. In this case, the curtain 15 would in fact be only partly unwound from the take-up device, and the first two rows of ports 20, being at least partly included in the wound section of the curtain, would be ineffective as ventilation

means.

A first modification of the inventive counter is depicted in Figure 2. Similar parts are denoted by the same reference numerals as in the previous example.

In this modification, generally shown at 30, each sheet 31a,b of the curtain 31 has an upper region 32 next to the take-up device 16 which is made of a material highly pervious to air, whereas the material from which the remainder of each sheet is formed is substantially impervious to gas. This can be accomplished, for example, by forming the upper region 32 from a very loosely woven fabric.

Shown in Figure 4 is a second modification of a refrigerated display counter according to the invention, as generally indicated at 40. Here again, similar parts are denoted by the same reference numerals as in the previous examples.

In this modified embodiment, the curtain 15 includes no ventilation means, the latter being provided in the form of ventilation ports 41 formed through the top wall 2c of the body 2 near the take-up devices 16. Also provided here are lighting devices 42 for the refrigerated compartment 3. By positioning the devices 42 and ports 41 close to one another, the latter can be made to act as exhaust stacks to dissipate the heat generated within the refrigerated compartment by the lighting system when turned on.

It will be appreciated that the principle of operation is, in all three of the embodiments proposed, that of slowing down and distributing the inflow of ambient air at the upper portion of the counter all along the counter length, so that this inflow, at all events unavoidable, will not disturb the air barrier which protects the refrigerated compartment. In this way, the air barrier will stop moisture-laden air from entering the refrigerated area.

The invention as described has an indisputable advantage in that it eliminates, or at least brings down to acceptable values, the formation of condensate on display counters when the opening for accessing the refrigerated compartment is closed by curtains or the like means. Advantageously, this result is achieved using extremely simple and inexpensive means, it being sufficient that appropriate ventilation ports be provided in the upper portion of the curtains and/or the counter body.

Claims

1. A refrigerated display counter comprising a counter body (2) to enclose a refrigerated compartment (3) having at least one vertically extending access opening protected by a barrier of cold air, said opening being provided with removable closure means (15) for tem-

porarily isolating said compartment (3) from the ambience outside the counter body, characterized in that it comprises ventilating means (20,32,41) associated with either or both of said counter body (2) and said closure means (15) to promote a non-turbulent circulation of ambient air between said cold air barrier and said closure means (15).

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2. A display counter according to Claim 1, wherein the ventilating means comprise at least one port (20) in said closure means (15) located near a top portion (2c) of said counter body. 10
3. A display counter according to either Claim 1 or 2, wherein said closure means comprise a curtain (15) adapted to be stretched over said access opening. 15
4. A display counter according to Claim 3, wherein said ventilating means comprise a plurality of throughgoing ports (20) clustered in the top portion of said curtain (15). 20
5. A display counter according to Claim 3, wherein said ventilating means comprise regions (32) of said curtain (31) having different properties of perviousness to air. 25
6. A display counter according to one or more of the preceding claims, wherein said ventilating means comprise at least one port (41) located in a top wall (2c) of said counter body. 30
7. A display counter according to Claim 6, wherein said at least one port (41) is open to said refrigerated compartment (3) at a location near lighting means (42) therefor to form an exhaust stack for dissipating the heat generated by the lighting means (42) from said compartment (3). 35

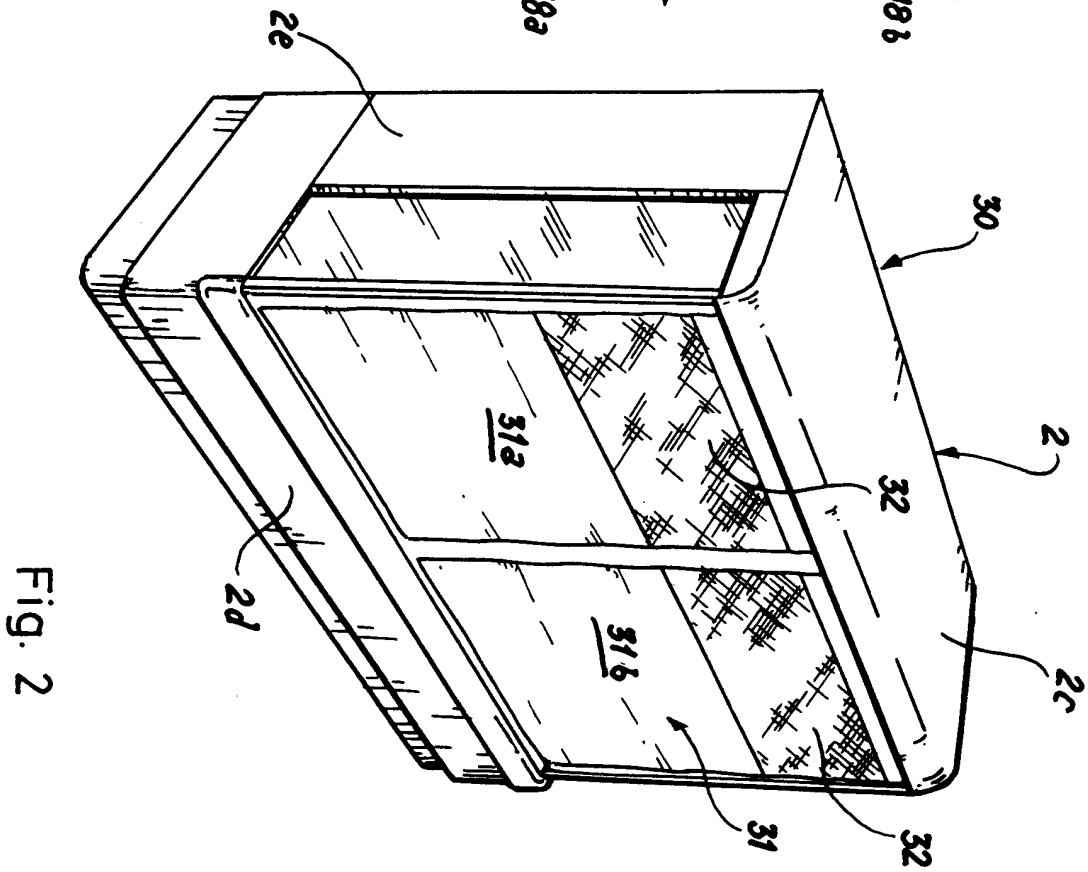
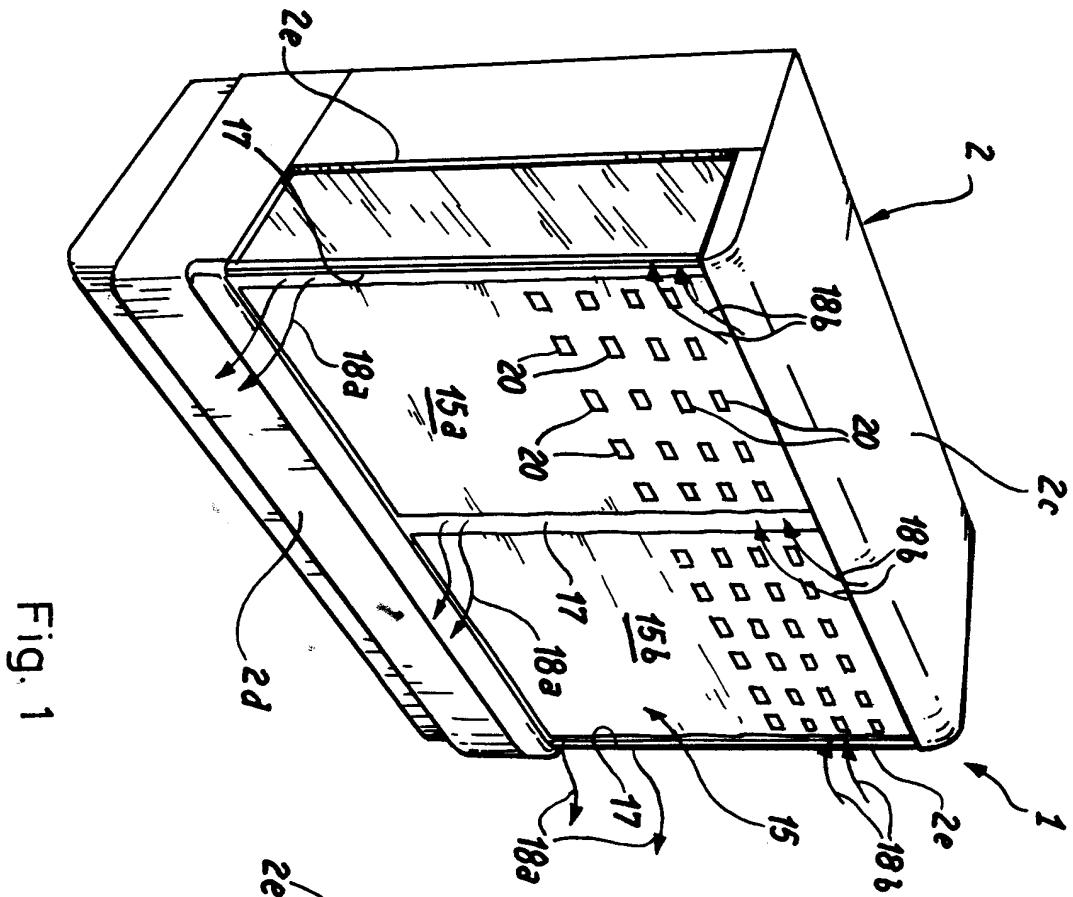
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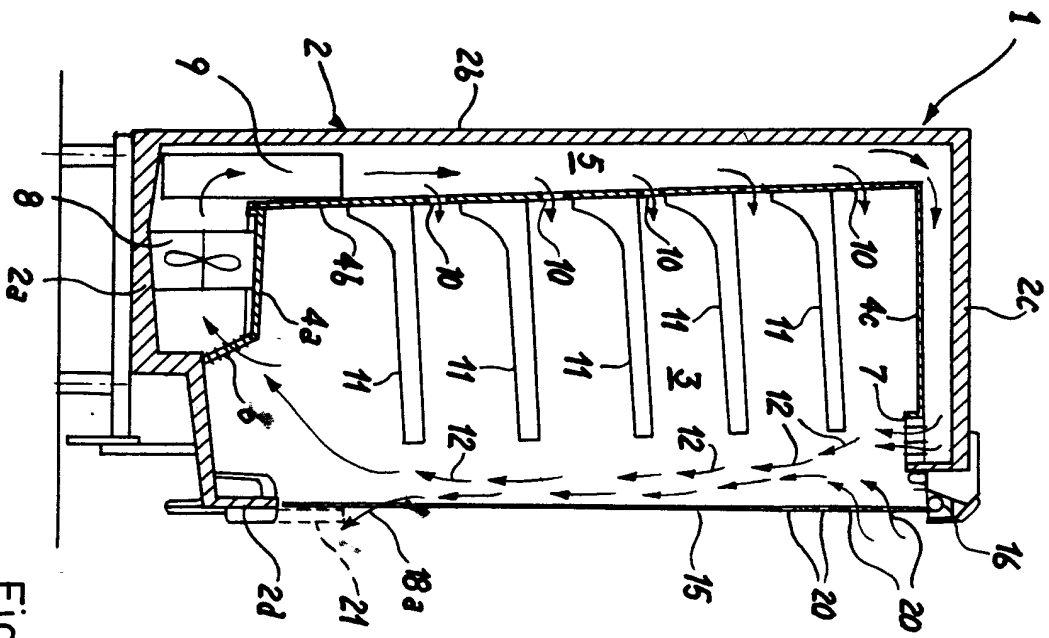


Fig. 3

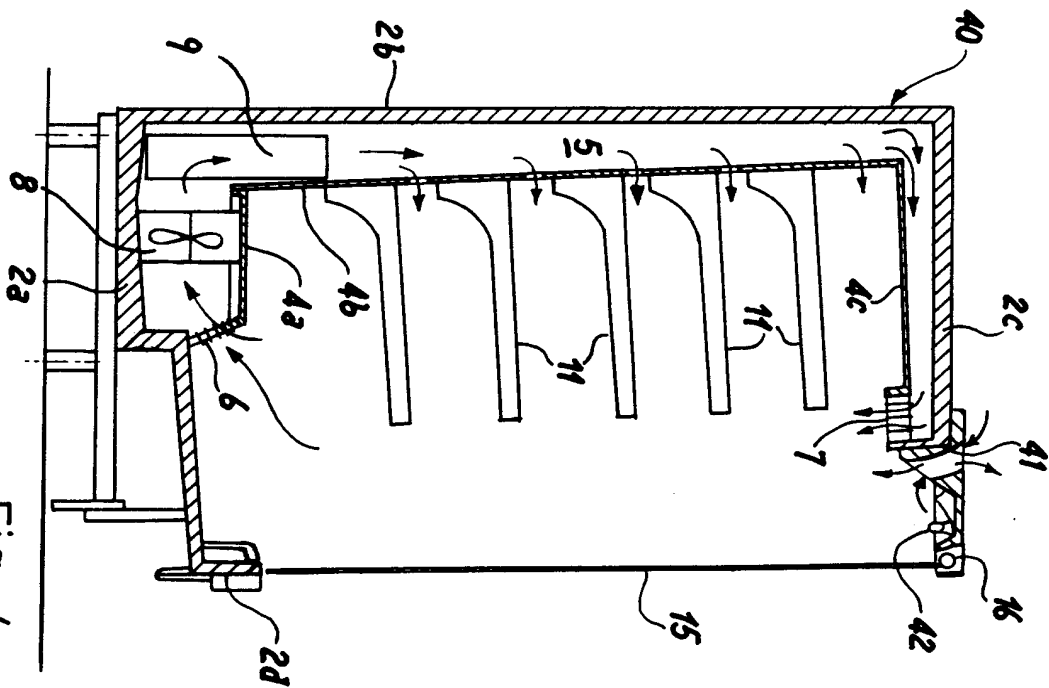


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1551

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	GB-A-2 092 730 (MASASHI KARASHIMA) * page 2, line 7 - line 109; figures 4,6 *	1	A47F3/04
A	GB-A-2 104 202 (SCHENKER) * page 2, line 13 - line 29; figure 1 * * page 3, line 128 - page 4, line 9; figure 9 *	1,2,6	
A	GB-A-682 231 (RYDIN) * page 1, line 33; figure 3 *	1	
A	US-A-4 117 698 (VOGEL) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			A47F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 September 1994	Examiner De Groot, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

DERWENT-ACC-NO: 1995-031379

DERWENT-WEEK: 199711

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TITLE: Refrigerated display case for shop comprises vertical display counter having access opening covered by cold air barrier, and removable closure elements contg. ventilation apertures

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PRIORITY-DATA: 1993IT-PD0145 (June 28, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
EP 630601 A1	December 28, 1994	EN
IT 1263382 B	August 5, 1996	IT

DESIGNATED-STATES: DE ES FR GB PT

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
EP 630601A1	N/A	1994EP-201551	June 1, 1994
IT 1263382B	N/A	1993IT-PD0145	June 28, 1993

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	A47F3/04 20060101

ABSTRACTED-PUB-NO: EP 630601 A1

BASIC-ABSTRACT:

the refrigerated counter comprises a body (2) which encloses a refrigerated compartment having vertical access openings protected by a barrier of cold air. The opening is covered by removable closure elements (15) for temporarily isolating the compartment from the external environment.

Ventilation ports (20) are provided in the closure elements, and are located near the bottom and top of the counter body.

ADVANTAGE - Prevents turbulence phenomena from disturbing cold air barrier.

CHOSEN-DRAWING: Dwg.1/4

TITLE-TERMS: REFRIGERATE DISPLAY CASE SHOP COMPRISE
VERTICAL COUNTER ACCESS OPEN COVER COLD
AIR BARRIER REMOVE CLOSURE ELEMENT CONTAIN
VENTILATION APERTURE

DERWENT-CLASS: P27 X27

EPI-CODES: X27-F01;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: 1995-024981